

A beginner's guide to suprachoroidal injections

They require a different skill set than intravitreal injections. Here's a description of the technique.

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Take-home points

- Suprachoroidal injections using specialized microneedles may enable targeted therapy to maximize efficacy and bioavailability in the posterior pole while minimizing impact on the anterior segment.
- Suprachoroidal injections can be easily performed in an office-based setting, but require special considerations that are different from conventional intravitreal injections.
- Clinicians should review the need for perpendicular orientation, firm pressure, slow injection speed and the potential to change quadrant or needle with the patient to manage expectations.



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Recent advances have led to the development of novel techniques for delivering drugs to the posterior pole of the eye. One such technique gaining momentum is suprachoroidal injection using microneedles.¹⁻³ Suprachoroidal injections involve delivery into the potential space between the choroid and sclera. This technique offers several advantages over other methods.

Potential advantages of suprachoroidal administration

The suprachoroidal space brings the injectate into close proximity with the choroid, retinal pigment epithelium and retina, which can provide higher bioavailability to the diseased tissues while minimizing impact on anterior segment tissues.¹⁻⁵ Thus, suprachoroidal injections of a steroid suspension could provide lower risk for ocular hypertension or cataract formation.



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What makes the microneedles different

Microneedles are hollow-bore needles that are just slightly longer than the thickness of the sclera and conjunctiva, typically around 900 μm . The product developers specifically chose this length to reach the suprachoroidal space reliably.⁶ The first approved use of microneedles in the suprachoroidal space was for the administration of a triamcinolone acetonide suspension via suprachoroidal injection (Xipere, Clearside Biomedical/Bausch + Lomb) for the treatment of uveitic cystoid macular edema.⁷

Across clinical trials, the 900- μm microneedle can successfully access the suprachoroidal space on the first injection attempt in 78 percent of patients without the need to measure the scleral thickness.⁸ For the remaining patients, a second attempt can be made in a different quadrant of the globe or with using a slightly longer 1,100- μm needle.

Although suprachoroidal microneedles are only currently approved for the treatment of uveitic CME, their use has been evaluated for retinal vein occlusions and diabetic macular edema,^{2,5,9,10} and is also undergoing trials for the delivery of tyrosine kinase inhibitors (TKIs) for neovascular age-related macular degeneration.

These microneedles are also under investigation as mode of delivering viral vectors for gene therapy, suspensions, hydrogels and sustained-release microspheres.¹¹⁻¹³ Therefore, learning how to perform the suprachoroidal injection technique will be an important addition to the retinal specialist's repertoire of skills.



procedure.

1. To prepare the injectate, shake the drug suspension vial vigorously for about 10 seconds to ensure it's mixed properly and to prevent potential needle clogging before loading it into the suprachoroidal microinjector following the manufacturer's instructions.
2. Attach the 900- μ m microneedle, which is generally recommended for the initial attempt. If the patient has had previous suprachoroidal injections and requires the longer 1,100- μ m needle, this alternative could be considered.
3. For positioning, we recommend placing the patient in a relaxed supine position with adequate head support.
4. A sterile lid speculum is very helpful for keeping the eyelids open during the procedure, as you may need both hands and the procedure takes much longer than intravitreal injections.
5. Confirm the site of injection, which is typically the superior temporal quadrant, approximately 4 to 4.5 mm from the limbus.
6. Topical or subconjunctival anesthetics will minimize discomfort. Although subconjunctival anesthesia may offer better analgesia, it also may increase the conjunctival thickness, making it more challenging to achieve good apposition of the microinjector against the surface of the globe.
7. A local antiseptic such as 5% povidone-iodine solution is
8. Hold the microinjector with one hand and align it perpendicular to the ocular surface at the selected injection site. Perpendicularity is essential for successfully accessing the suprachoroidal space. Looking at your microinjector orientation from several viewing angles can improve your accuracy of alignment to be perpendicular to the globe surface.
9. Insert the microneedle with stable and firm pressure, enough to create a dimple or indentation on the ocular surface, indicating proper needle placement.
10. Inject slowly over 5 to 10 seconds while maintaining steady, firm pressure. This is best done with a two-hand technique. Occasionally, you may need to slightly pivot the microinjector like a joystick while applying pressure to achieve the correct angle, at which point you will feel a release of resistance. Patients usually feel discomfort at the very beginning of the injection, especially when the injection is performed too rapidly. So gently pushing the plunger with one hand while firmly holding the microinjector against the globe with the other hand is preferred.
11. Keep the hub of the microinjector against the eye for 3 to 5 seconds after completing the drug injection before removing it from the eye. Apply light pressure with a sterile cotton swab at the injection site for approximately 3 to 5 additional seconds.

Patient considerations

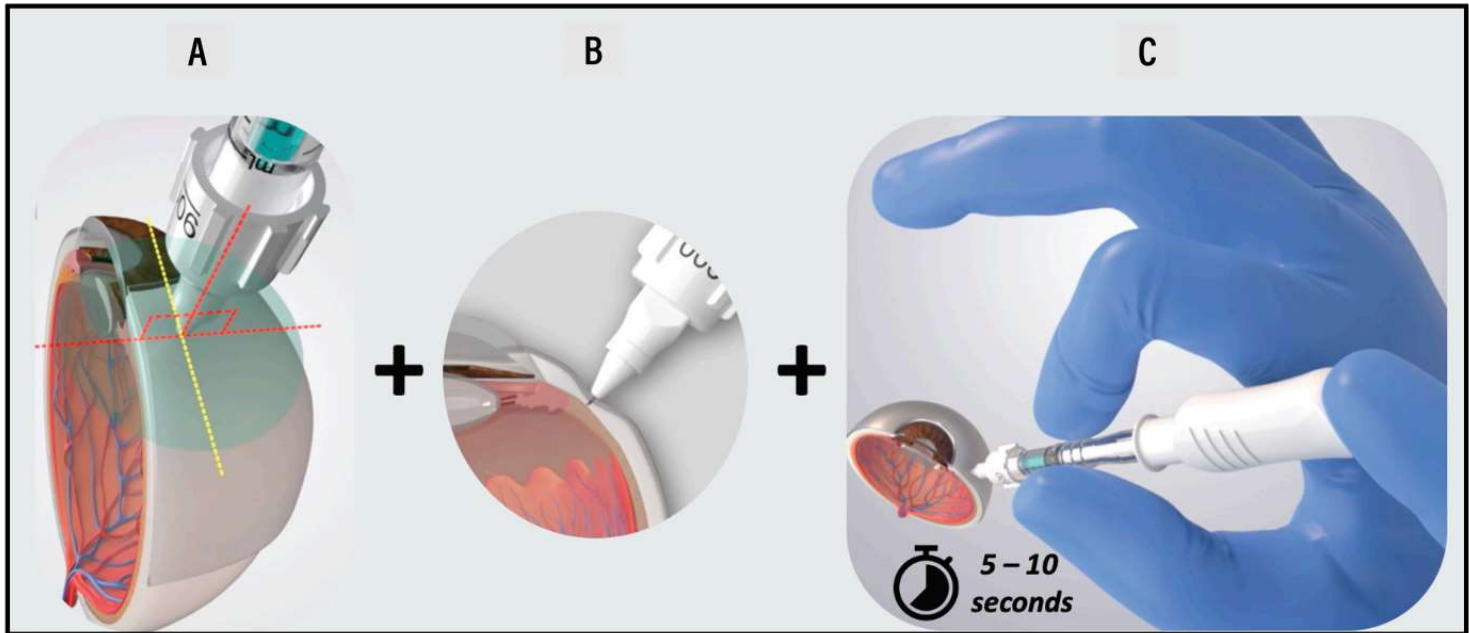
Choosing the right patients for suprachoroidal injections is critical to ensure a good outcome, especially when the physician is still in the early stages of learning this technique. For example, although scleral thickness doesn't have to be measured before the injection, patients with known scleral thinning, high myopia or axial elongation may not be the best initial candidates.

Additionally, patients with a history of glaucoma, hypotony, a previous trabeculectomy or glaucoma shunt, or recent cataract or retinal surgery, especially involving scleral buckling, may have higher risks for complications. Although these aren't absolute contraindications, many weren't included in clinical trials using suprachoroidal microneedles, so the risk profile in real-world use is currently unknown.

Inform caregivers of common side effects, such as subconjunctival hemorrhage, as well as the signs and symptoms of more serious problems, such as infection, retinal detachment or suprachoroidal hemorrhage.

Managing patient expectations

Patients should be aware that the injection will take more time, require careful positioning and could cause some discomfort. Most patients report a sensation of a “pressure wave” or headache similar to the “brain freeze” from eating ice cream. A very slow speed of injection can mitigate this. Patients should also be told that there may be a need to exchange needles to find the optimal length for that patient.



The appropriate injection technique for suprachoroidal space (SCS) injection with the SCS Microinjector includes the following steps: A) Maintaining perpendicular alignment of the device relative to the injection location; B) While, at the same time, pressing against the surface of the eye with the needle hub to create a dimple, a localized depression; and C) Once loss of resistance is observed, inject slowly, over 5 to 10 seconds. (Courtesy Bausch + Lomb)

Strategies for success

Preinjection pupil dilation can aid in monitoring the eye after the injection. Pupil dilation isn't essential; it depends on the physician's preference.

In clinical trials, suprachoroidal injection success rate in the superotemporal quadrant was 78 percent compared to 65 percent for the inferotemporal quadrant, so the superotemporal quadrant is slightly preferred.⁸

Often, simply applying slightly firmer pressure and ensuring perpendicular orientation will be sufficient to achieve a successful injection. If you use the 1,100- μ m microneedle, fill the syringe with more injectate and prime the microneedle to minimize air bubbles or underdosing. Repeat injection site prep when switching between quadrants or needles to ensure sterility.

Postinjection care and monitoring

Inform caregivers of common side effects, such as subconjunctival hemorrhage, as well as the signs and symptoms of more serious potential complications, such as infection, retinal detachment or suprachoroidal hemorrhage. Although rare, patients and their caregivers should be aware of them and seek medical attention if concerning symptoms arise.

Potential complications

No cases of endophthalmitis were reported across eight Phase II and III studies of suprachoroidal triamcinolone. This isn't unexpected, because the risk of endophthalmitis in the absence of perforation into the vitreous cavity should be very low. Given the mechanism of action for suprachoroidal injections, physicians may want to watch for signs of scleritis or periocular inflammation instead.

Although most clinical trials using suprachoroidal triamcinolone showed low rates of cataract and IOP elevation, many of these studies may have been too short in duration to observe these complications. Close monitoring and awareness remains important until more long-term, real-world data become available.^{1,7,9,14,15}

Bottom line

Suprachoroidal injections are a new and innovative technique that may provide improved bioavailability to the posterior pole while minimizing exposure and adverse effects on the anterior segment. Despite the ease of this in-office procedure, the suprachoroidal injection technique requires setting patient expectations, maintaining perpendicular orientation and firm pressure with the microinjector, injecting gently and slowly, and preparing for the need to switch location or needle. Potential applications beyond delivering steroids, including angiogenesis inhibitors and gene therapies, may broaden the scope of suprachoroidal delivery in ophthalmic practice. **RS**

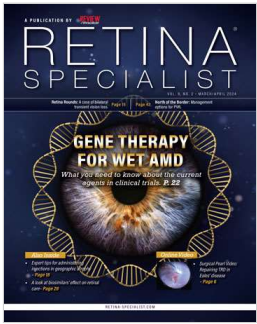
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